



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of: )  
Inventors: Wei Gao et al. ) ATTORNEY FILE NO.:  
Serial No.: 10/813,789 ) SLA0837  
Filed: March 26, 2004 )  
Title: METHOD OF FORMING A ) Examiner: Arancibia,  
MICROLENS ARRAY ) Maureen G.  
 ) Customer No.: 55,286  
 ) Group Art: 1763  
 ) Confirmation No.: 5215  
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Board of Patent Appeals and Interferences  
United States Patent and Trademark Office  
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Alexandria, VA 22313-1450

**BRIEF ON APPEAL**

This is an appeal from the rejection by Examiner Maureen Gramaglia Arancibia, Group Art Unit 1763, of claims 1-13 and 15-21 as set forth in the CLAIMS APPENDIX, all claims in the application.

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## **REAL PARTY IN INTEREST**

The real party in interest is Sharp Laboratories of America, Inc. (SLA), as assignee of the present application by an Assignment in the United States Patent Office, with a recordation date of March 26, 2004 at Reel 015170, Frame 0745.

## **RELATED APPEALS AND INTERFERENCES**

None.

## **STATUS OF THE CLAIMS**

Claims 1-13 and 15-21 are in the application.

Claims 1-13 and 15-21 are rejected.

Claims 1-13 and 15-21 are appealed.

## **STATUS OF AMENDMENTS**

Amendments to the claims were made in a paper received at the PTO on January 2, 2007. These amendments have been entered.

## **SUMMARY OF CLAIMED SUBJECT MATTER**

Claim 1 recites a method for forming a microlens structure, as shown in Figs. 2 through 6. As seen in Fig. 2, a transparent material 14 is provided overlying a substrate 10. A hard mask 16 overlies the transparent layer 14 (specification; page 2, ln. 24-26). In Fig. 3, an opening 26 is formed in photoresist 24, which has been deposited over the hardmask 16, (specification; page 3, ln. 1-3). The photoresist is used to pattern an opening 27 in the hard mask 16, as seen in Fig. 4 (specification; page 3, ln. 17). Both the hard mask 16 and the transparent

material are etched using an isotropic (non-directional) wet etch, as depicted in Fig. 5. The wet etch etches the hard mask faster than it is does the underlying transparent material, forming a lens shape (specification; page 3, ln. 22 through page 4, ln. 2). The lens shape is also the result of the hard mask being laterally etched to expose underlying regions of transparent material as the etch proceeds (specification; page 3, ln. 20-22). As shown in Fig. 6, the method ends with the removal of the hard mask, leaving a lens structure formed in the transparent material 14 (specification; page 4, ln. 3-5).

Claim 21 recites a method for forming a microlens structure, as shown in Figs. 2 through 6. As seen in Fig. 2, a transparent material 14 is provided overlying a substrate 10. A hard mask 16 overlies the transparent layer 14 (specification; page 2, ln. 24-26). In Fig. 3, an opening 26 is formed in photoresist 24, which has been deposited over the hardmask 16, (specification; page 3, ln. 1-3). The photoresist is used to pattern an opening 27 in the hard mask 16, as seen in Fig. 4 (specification; page 3, ln. 17). In Fig. 5 an isotropic wet etch is applied, etching the hard mask faster than it is does the transparent (specification; page 3, ln. 22 through page 4, ln. 2). The hard mask is laterally etched to expose underlying area of transparent material (specification; page 3, ln. 20-22). As a result of the etching, a lens shape is formed in the transparent material (specification; page 3, ln. 24-25). As shown in Fig. 6, the method ends with the removal of the hard mask (specification; page 4, ln. 3-5).

## **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

1. Whether claims 1-11, 13, 17, 20, and 21 are anticipated under 35 U.S.C. 102(e) by Ozawa (US 6,781,762).
2. Whether claim 12 is unpatentable under 35 U.S.C. 103(a) with respect to Ozawa in view of Hawkins et al. ("Hawkins"; US 6,211,916).
3. Whether claim 15 is unpatentable under 35 U.S.C. 103(a) with respect to Ozawa in view of Rhodes (US 6,307,243) and Yamamoto (US 2004/0082094).
4. Whether claim 16 is unpatentable under 35 U.S.C. 103(a) with respect to Ozawa in view of Hawkins and Tsunetomo et al. ("Tsunetomo"; US 2003/0157211).
5. Whether claims 18 and 19 are unpatentable under 35 U.S.C. 103(a) as unpatentable with respect to Ozawa in view of Tsunetomo.

## **ARGUMENT**

1. *The rejection of claims 1-11, 13, 17, 20, and 21 as anticipated by Ozawa (US 6,781,762) under U.S.C. 102(e).*

In Section 2 of the Office Action claims 1-11, 13, 17, 20, and 21 have been rejected under 35 U.S.C. 102(e) as anticipated by Ozawa (US 6,781,762). With respect to claims 1 and 21, the Office Action states that Ozawa discloses an isotropic wet etch process that etches the hard mask faster than the transparent material, citing col. 15, ln. 3-6 and 13-14. The Office Action also states that, "the hard mask (sic) 220' is *partially*

removed by this lateral etching process, *as broadly recited in the claims.*"

This rejection is traversed as follows.

Beginning at col. 15, ln. 3, Ozawa states,

Subsequently, as shown in FIG. 12(c), the first film 220' and the transparent plate member 210a are wet-etched with an etchant of hydrofluoric acid type, or the like through the mask 612 which is provided with such pits 612a. Then, the first film 220' is etched faster because the etching rate of this first film 220' for the etchant is higher than that of the transparent plate member 210a. More specifically, before the etching penetrates through the first film 220', spherical recesses are excavated in the parts of the first film 220' around the pits 612a by the wet etching which has no directionality, but after the penetration, the first film 220' is etched faster. Therefore, the etching spreads sideways faster than in the depthwise direction of the pits 612a, that is, side etching proceeds relatively much, so that recesses 220a each being in the shape of a pan of shallow bottom are excavated around the pits 612a.

The Examiner has incorrectly identified first film 220' as a hard mask. The above-quoted section, cited in the Office Action, describes the difference between the etch rate of first film 220' and the transparent plate 210. Ozawa discloses a hard mask 612 that is a temporary structure used for etching. The Examiner appears to treating the first film 220' as a second layer of hard mask.

In the **Response to Arguments** Section of the Office Action the Examiner states that "Layer 220' functions as a hard mask as would be understood by one of skill in the art". However, this assertion is incorrect, as it is notoriously well known in the art that a mask or hard mask is a temporary structure used in the process of selectively etching semiconductor regions. However, a mask is always removed after the etching process is complete. Ozawa does not remove film 220 (it is part of

the permanent structure), therefore, film 220 cannot be called a mask. The Applicant respectfully submits that if film 220' was a hard mask, Ozawa would have labeled it as such. The Applicant requests that the term "hard mask" be given the meaning ascribed to it by persons skilled in the art.

This above-cited section from Ozawa does not address the issue of etching the hard mask 612. More particularly, the above-quoted section does not state that the hard mask 612 is etched faster than the transparent material (as recited in the Applicant's claims). In fact, Figs. 12c and 12d clearly show that the first film 220' and transparent plate 210 are etched at a rate *faster* than the hard mask 612, since the recesses in films 220' and 210 undercut the hard mask 612.

Further, the Applicant's claims recite that the hard mask is removed as the last step in the process, following the formation of the lens in the transparent material. Even if Ozawa first film 220' could be interpreted to be a hard mask, Ozawa's first film 220' is not removed after wet etching. See Ozawa's Fig. 12f – film 220 remains as part of the final structure.

The Examiner states that, "the hard mask (sic) 220' is partially removed by this lateral etching process, *as broadly recited in the claims.*" However, the Applicant's claims recite the step of "removing the hard mask". Clearly, the limitation of "partially removing" can be distinguished from the limitation of "removing". Alternately stated, the Applicant's claims do not include a step of partially removing the hard mask.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a

single prior art reference.” *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

With respect to both claims 1 and 21, Ozawa fails to disclose a hard mask that is wet etched at a rate faster than the transparent substrate. Further, even if Ozawa’s first film 220 could be interpreted to be a “hard mask”, Ozawa fails to disclose first film 220 being removed after wet etching. Ozawa merely describes a partial removal of the first film 220. Since Ozawa does not explicitly disclose each and every limitation of claim 1, he cannot anticipate. Claims 2-11, 13, 17, and 20, dependent from claim 1, all enjoy the same distinctions from the cited art.

With respect to claim 21, Ozawa additionally fails to disclose a hard mask that is laterally etched to expose an underlying area of transparent material. As noted above, Ozawa’s Figs. 12c and 12d show just the opposite. Since Ozawa’s hard mask 612 is etched at a rate slower than transparent layers 220’ and 210, rather than exposing these layers, the hard mask 612 is undercut by transparent layers 220’ and 210.

**2. *The rejection of claim 12 as unpatentable under U.S.C. 103(a) with respect to Ozawa in view of Hawkins et al. (“Hawkins”; US 6,211,916).***

In Section 4 of the Office Action claim 12 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Ozawa in view of Hawkins et al. (“Hawkins”; US 6,211,916). The Office Action acknowledges that Ozawa does not teach planarizing using a CMP process. The Office Action states that Hawkins discloses such a process, and that it would have been obvious to modify Ozawa in light of Hawkins, with the motivation being “to planarize the lens material optically flat.”

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated in MPEP § 2143, there are three requirements to establish a *prima facie* case of obviousness.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck* 947 F.2d 488, 20 USPQ2d, 1438 (Fed. Cir. 1991).

At col. 5, ln. 25-26, Hawkins mentions that "the lens material 130 is planarized optically flat, preferably by chemical mechanical polishing." This sentence is Hawkins' complete teaching on the subject.

The Ozawa and Hawkins references have been combined based upon the assumption that the combination discloses all the elements of independent claim 1. However, as noted above in response to the anticipation rejection, Ozawa fails to disclose a hard mask that is etched at a rate faster than the underlying material. Ozawa also fails to disclose the removal of the hard mask after the lens is formed via the etching process. Neither does Hawkins address either one of these limitations.

With respect to the third *prima facie* requirement to support a case for obviousness, even if the Ozawa and Hawkins are combined, they do not explicitly disclose the above-mentioned limitations recited in claim 1. Claim 12, dependent from claim 1, enjoys the same distinctions.

With respect to the first *prima facie* requirement, the Office Action states that it would have been obvious to combine the prior art teachings with the motivation being “to planarize the lens material optically flat.” However, even if this assertion was correct, it does not explain how an expert in the art could have modified Ozawa’s permanent film layer 220 and conventional etch-resistant hard mask 612 to describe all the elements of the claimed invention. As explained above in response to the third *prima facie* requirement, even when combined, the Ozawa and Hawkins references fail to disclose all of the claimed invention limitations. The above-quoted analysis from Office Action does not explain how even a person with skill in the art could modify Ozawa’s lens structure, since neither reference discloses the use of a hard mask that is etched faster than the lens material, or which can be removed after etching. Ozawa’s structure is more complicated and requires more steps of processing. Alternately stated, the motivation to modify these references cannot be built upon a mere desire to “planarize the lens material”, as this analysis teaches nothing about the claimed invention. Rather, to meet the first *prima facie* requirement, there must be an explicit teaching in the Hawkins reference that shows an expert how the Ozawa reference can be modified to yield the claimed invention. Such a *prima facie* case has not been made, simply because all the Applicant’s claim limitations cannot be found in the two references.

Alternately, if the Examiner is relying upon the knowledge of a person with skill in the art to supply motivation lacking the Ozawa and Hawkins references, then additional evidence should have been provided in the Office Action. Notable, when the source or motivation is not from the prior art references, “the evidence” of motive will likely consist of an

explanation or a well-known principle or problem-solving strategy to be applied". *DyStar*, 464 F.3d at 1366, 80 USPQ2d at 1649. The Examiner has not supplied any explanation of how an expert could possibly modify either of the references to incorporate the use of a fast etching hard mask that can be removed after the lens is formed.

Considered from the perspective of the second *prima facie* requirement, even if an expert were given the Ozawa and Hawkins references as a foundation, no evidence has been provided to show that there is a reasonable expectation of success in the claimed invention.

In summary, the Applicant respectfully submits that a *prima facie* case has not been made to support the rejection of claim 12 as obvious.

***3. The rejection of claim 15 as unpatentable under U.S.C. 103(a) with respect to Ozawa in view of Rhodes (US 6,307,243) and Yamamoto (US 2004/0082094).***

In Section 5 of the Office Action claim 15 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Ozawa in view of Rhodes (US 6,307,243) and Yamamoto (US 2004/0082094). The Office Action acknowledges that Ozawa does not disclose a TEOS first film 220', as Rhodes, or a thermal oxide transparent material, as does Yamamoto. The Office Action states that it would have been obvious to combine the teachings of the three references, with the motivation being to form a TEOS first film for improved conformal deposition, and to form a thermal oxide by blanket deposition.

The Ozawa, Rhodes, and Yamamoto references have been combined based upon the assumption that the combination discloses all

the elements of independent claim 1. However, as noted above in response to the anticipation rejection, Ozawa fails to disclose a hard mask that is etched at a rate faster than the underlying material. Ozawa also fails to disclose the removal of the hard mask after the lens is formed via the etching process. Neither Rhodes nor Yamamoto address these limitations.

With respect to the third *prima facie* requirement to support a case for obviousness, even if the Ozawa, Rhodes, and Yamamoto are combined, they do not explicitly disclose the above-mentioned limitations recited in claim 1. Claim 15, dependent from claim 1, enjoys the same distinctions.

With respect to the first *prima facie* requirement, the Office Action states that it would have been obvious to combine the prior art teachings with the motivation being to improve conformal deposition or to form a transparent thermal oxide. However, these assertions do not explain how an expert in the art could have modified Ozawa's permanent film layer 220 and conventional etch-resistant hard mask 612 to describe all the elements of the claimed invention. As explained above in response to the third *prima facie* requirement, even when combined, the Ozawa, Rhodes, and Yamamoto references fail to disclose all of the claimed invention limitations. The above-quoted analysis from Office Action does not explain how even a person with skill in the art could modify Ozawa's lens structure, since neither reference discloses the use of a hard mask that is etched faster than the lens material, or which can be removed after etching. Alternately stated, the motivation to modify these references cannot be built upon a mere desire to improve conformal deposition, as this analysis teaches nothing about the limitations of the

claimed invention. Rather, to meet the first *prima facie* requirement, there must be an explicit teaching in Rhodes and Yamamoto that shows an expert how the Ozawa reference can be modified to yield the claimed invention. Such a *prima facie* case has not been made, because all the Applicant's claim limitations cannot be found in the three references.

Alternately, if the Examiner is relying upon the knowledge of a person with skill in the art to supply motivation lacking the Ozawa, Rhodes, and Yamamoto references, then additional evidence should have been provided in the Office Action. The Examiner has not supplied any explanation of how an expert could possibly modify either of the references to incorporate the use of a fast etching hard mask that can be removed after the lens is formed.

Considered from the perspective of the second *prima facie* requirement, even if an expert were given the Ozawa, Rhodes, and Yamamoto references as a foundation, no evidence has been provided to show that there is a reasonable expectation of success in the claimed invention.

In summary, the Applicant respectfully submits that a *prima facie* case has not been made to support the rejection of claim 15 as obvious.

**4. *The rejection of claim 16 as unpatentable under U.S.C. 103(a) with respect to Ozawa in view of Hawkins and Tsunetomo et al. (“Tsunetomo”; US 2003/0157211).***

In Section 6 of the Office Action claim 16 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Ozawa in view of Hawkins and Tsunetomo et al. (“Tsunetomo”; US 2003/0157211). The

Office Action acknowledges that Ozawa and Hawkins do not disclose a doped first film 220', but that Tsunetomo does. The Office Action states that it would have been obvious to combine the teachings of the three references, with the motivation being that the etching can be shaped.

The Ozawa, Hawkins, and Tsunetomo references have been combined based upon the assumption that the combination discloses all the elements of independent claim 1. However, as noted above in response to the anticipation rejection, Ozawa fails to disclose a hard mask that is etched at a rate faster than the underlying material. Ozawa also fails to disclose the removal of the hard mask after the lens is formed via the etching process. Neither Hawkins nor Tsunetomo address these limitations.

With respect to the third *prima facie* requirement to support a case for obviousness, even if the Ozawa, Hawkins, and Tsunetomo are combined, they do not explicitly disclose the above-mentioned limitations recited in claim 1. Claim 16, dependent from claim 1, enjoys the same distinctions.

With respect to the first *prima facie* requirement, the Office Action states that it would have been obvious to combine the prior art teachings with the motivation being to obtain etched portions with the desired shape. However, this assertion does not explain how an expert in the art could have modified Ozawa's permanent film layer 220 and conventional etch-resistant hard mask 612 to describe the all the elements of the claimed invention. As explained above in response to the third *prima facie* requirement, even when combined, the Ozawa, Hawkins, and Tsunetomo references fail to disclose all of the claimed invention limitations. The above-quoted analysis from Office Action does not

explain how even a person with skill in the art could modify Ozawa's lens structure, since neither reference discloses the use of a hard mask that is etched faster than the lens material, or which can be removed after etching. Alternately stated, the motivation to modify these references cannot be built upon a mere desire to shape the etched portions, as this analysis teaches nothing about the limitations of claim 1. Rather, to meet the first *prima facie* requirement, there must be an explicit teaching in Hawkins and Tsunetomo that show an expert how the Ozawa reference can be modified to yield the claimed invention. Such a *prima facie* case has not been made, because all the Applicant's claim limitations cannot be found in the three references.

Alternately, if the Examiner is relying upon the knowledge of a person with skill in the art to supply motivation lacking the Ozawa, Hawkins, and Tsunetomo references, then additional evidence should have been provided in the Office Action. The Examiner has not supplied any explanation of how an expert could possibly modify either of the references to incorporate the use of a fast etching hard mask that can be removed after the lens is formed.

Considered from the perspective of the second *prima facie* requirement, even if an expert were given the Ozawa, Hawkins, and Tsunetomo references as a foundation, no evidence has been provided to show that there is a reasonable expectation of success in the claimed invention.

In summary, the Applicant respectfully submits that a *prima facie* case has not been made to support the rejection of claim 16 as obvious.

**5. *The rejection of claims 18 and 19 as unpatentable under U.S.C. 103(a) with respect to Ozawa in view of Tsunetomo.***

In Section 7 of the Office Action claims 18 and 19 have been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Ozawa in view of Tsunetomo. The Office Action acknowledges that Ozawa does not disclose a layer of transparent material with the overlying layers having a faster etch rate than the underlying layers. The Office Action states that Tsunetomo discloses such a feature and that the motivation to combine references would be to form a lens having an aspherical shape.

The Ozawa and Tsunetomo references have been combined based upon the assumption that the combination discloses all the elements of independent claim 1. However, as noted above in response to the anticipation rejection, Ozawa fails to disclose a hard mask that is etched at a rate faster than the underlying material. Ozawa also fails to disclose the removal of the hard mask after the lens is formed via the etching process. Tsunetomo also fails to address these limitations.

With respect to the third *prima facie* requirement to support a case for obviousness, even if the Ozawa and Tsunetomo are combined, they do not explicitly disclose the above-mentioned limitations recited in claim 1. Claims 18 and 19, dependent from claim 1, enjoy the same distinctions.

With respect to the first *prima facie* requirement, the Office Action states that it would have been obvious to combine the prior art teachings with the motivation being to obtain etched portions having an aspherical shape. However, this assertion does not explain how an expert in the art could have modified Ozawa's permanent film layer 220 and

conventional etch-resistant hard mask 612 to describe all the elements of the claimed invention. As explained above in response to the third *prima facie* requirement, even when combined, the Ozawa and Tsunetomo references fail to disclose all of the claimed invention limitations. The above-quoted analysis from Office Action does not explain how even a person with skill in the art could modify Ozawa's lens structure, since neither reference discloses the use of a hard mask that is etched faster than the lens material, or which can be removed after etching. Alternately stated, the motivation to modify these references cannot be built upon a mere desire to shape the etched portions, as this analysis teaches nothing about the limitations of claim 1. Rather, to meet the first *prima facie* requirement, there must be an explicit teaching in Tsunetomo that shows an expert how the Ozawa reference can be modified to yield the claimed invention. Such a *prima facie* case has not been made, because all the Applicant's claim limitations cannot be found in all the references.

Alternately, if the Examiner is relying upon the knowledge of a person with skill in the art to supply motivation lacking the Ozawa and Tsunetomo references, then additional evidence should have been provided in the Office Action. The Examiner has not supplied any explanation of how an expert could possibly modify either of the references to incorporate the use of a fast etching hard mask that can be removed after the lens is formed.

Considered from the perspective of the second *prima facie* requirement, even if an expert were given the Ozawa and Tsunetomo references as a foundation, no evidence has been provided to show that there is a reasonable expectation of success in the claimed invention.

In summary, the Applicant respectfully submits that a *prima facie* case has not been made to support the rejection of claims 18 and 19 as obvious.

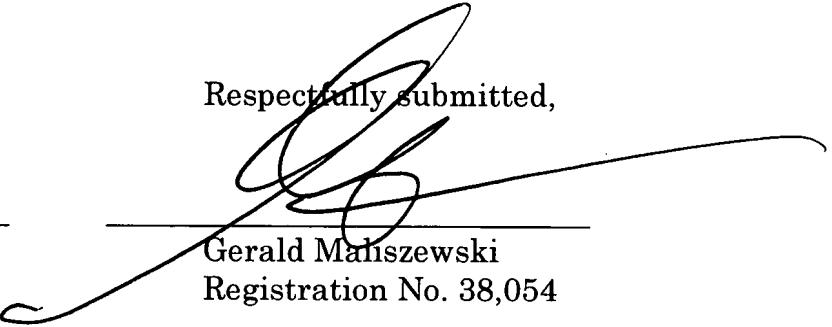
## SUMMARY AND CONCLUSION

It is submitted that for the reasons pointed out above, the claims in the present application clearly and patentably distinguish over the cited references. Accordingly, the Examiner should be reversed and ordered to pass the case to issue.

The fee for this Appeal Brief is enclosed. Authorization is given to charge any deficit or credit any excess to Deposit Account No. 502033.

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## **CLAIMS APPENDIX**

1. (previously presented) A method of forming a microlens structure comprising:

providing a transparent material;

forming a hard mask overlying the transparent material;

patterning an opening in the hard mask;

forming a lens shape by etching the hard mask and the transparent material using an isotropic wet etch that etches the hard mask faster than the transparent material, whereby the hard mask is etched laterally to expose a larger area of the underlying transparent layer as the etch proceeds; and,

removing the hard mask.

2. (original) The method of claim 1, further comprising filling the lens shape with a lens material.

3. (original) The method of claim 1, wherein the transparent material is silicon oxide, or glass.

4. (original) The method of claim 1, wherein the transparent material is an optical resin.

5. (original) The method of claim 3, wherein the isotropic wet etch is a buffered HF etch.

6. (original) The method of claim 2, wherein the lens material has a higher refractive index than the transparent material.

7. (original) The method of claim 3, wherein the lens material comprises HfO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub>, ZnO<sub>2</sub>, or optical resin.

8. (original) The method of claim 2, further comprising forming an AR coating overlying the lens material.

9. (original) The method of claim 8, wherein the AR coating is a single layer AR coating.

10. (original) The method of claim 9, wherein the single layer AR coating comprises silicon oxide, glass, or optical resin.

11. (original) The method of claim 2, further comprising planarizing the lens material.

12. (original) The method of claim 11, wherein planarizing the lens material comprises chemical mechanical polishing.

13. (original) The method of claim 11, wherein planarizing comprises reflowing the lens material.

14. canceled

15. (previously presented) The method of claim 1, wherein the hard mask is TEOS oxide and the transparent material is thermal oxide.

16. (original) The method of claim 12, wherein the hard mask is a doped silicon oxide and the transparent material is undoped silicon oxide.

17. (original) The method of claim 1, wherein the opening in the hard mask has non-vertical walls.

18. (original) The method of claim 1, further comprising a second transparent material overlying the transparent material.

19. (original) The method of claim 18, wherein the second transparent material has a faster etch rate than the transparent material.

20. (original) The method of claim 1, wherein the transparent layer is provided overlying a substrate having a photodetector formed thereon.

21. (previously presented) A method for forming a microlens structure, the method comprising:

providing a transparent material;  
forming a hard mask overlying the transparent material;

patterning an opening in the hard mask;  
applying an isotropic wet etch;  
etching the hard mask faster than the transparent material;  
laterally etching the hard mask to expose an underlying area  
of the transparent material;  
forming a lens shape in the transparent material; and,  
removing the hard mask.

## **EVIDENCE APPENDIX**

**NONE**

## **RELATED PROCEEDINGS APPENDIX**

**NONE**